

Camera Tech for Small Transit System Safety

By Erik Berg

Major events happen in the blink of an eye, but when that eye is a digital camera, events become more than mere memories; they become records and evidence. Camera systems have long provided added safety and security on school buses and on vehicles of major urban transit providers. These are benefits that a growing number of rural and small urban transit operators now enjoy thanks to lower costs for cameras and improved technology. Public and private transit providers are outfitting their vehicles with multiple interior and exterior cameras to improve safety, organizational performance and customer service, and to serve as a definitive record when the unforeseen happens.

Digital cameras record critical bus safety data

In its document, *Safety, Security, and Emergency Preparedness Excellence – a Roadmap for Small, Rural and Community Transit*, the Federal Transit Administration's Transit Bus Safety and Security Program include comprehensive record-keeping as a key component of safety data acquisition and analysis. Accident investigation data, reports of "near-misses," and passenger complaint records are all vital parts of safety data analysis. While not specifically recommended by the voluntary Safety and Security Program, video recordings can provide much of this vital data needed to study safety trends.

Digital camera systems used in modern transit systems can be equipped with accelerometers to record vehicle speed, lateral G-forces, whether and when vehicle brakes and emergency systems were engaged, audio records, and views inside and outside the vehicle.

Cameras improve driver's visibility

The Transit Cooperative Review Program (TCRP) ranked "driver vision

or mirrors" as the second most effective bus accident prevention practice in their TCRP Report 66, published in 2001. Exterior and interior cameras can improve driver vision and enhance safety. In discussing on-board interior cameras, the TCRP found that although no formal studies had been undertaken of camera effectiveness in improving safety, transit systems anecdotally indicated "that the total dollar amount of claims can be reduced by 10-20 percent by having video cameras and recorders on-board the vehicle."

Digital systems have replaced old videotape recorders as the systems of choice for transit buses, with more hours of storage capacity and the ability to handle multiple interior and exterior-mounted cameras and streams of data.

Mark Barkley, client consultant with Roscoe Vision Systems, explained that multiple exterior cameras help drivers be more aware of their surroundings.

Rear-mounted cameras. "A rear-mounted camera is triggered to come on when [the vehicle is] in reverse, where vehicles have a huge blind spot," Barkley said. "The camera view extends approximately 30 ft behind the vehicle, and gives a 120 degree view. This is proven to eliminate about 95 percent of back-up accidents."

Side-mounted cameras. Barkley said side-mounted cameras often focus on the door and the area just to the rear of it, giving the driver a view of those boarding, and of passengers and other pedestrians immediately surrounding the vehicle. This extra visibility is especially helpful in preventing accidents where pedestrians drop something or get caught on part of the vehicle.

Two-way cameras watch the inside as well as the outside

Two-way digital recording cameras are gaining popularity for their ability to record activity in the interior and driver's seat, and also out the windshield.



This dual-view digital camera shows views inside and outside the windshield.



Cameras mounted on the rear outside of the vehicle typically have a dust/water guard.



This seven-inch LCD color monitor backup camera system with 30 ft night vision and audio helps increase visibility and awareness.

All photos in this article courtesy of Roscoe Inc.

"There are three big benefits with the two-way windshield cameras," said Barkley, "First, the sight and sound they record gives fleet managers an idea of driver behavior. Ninety-five percent of accidents are related to driver behavior. Second, they capture and save video and data of driver behavior. Third, if there is an accident, the sensor's video footage captures the accident, minimizing liability to the transit provider if the driver is not at fault for the accident." These sensors also record audio and vehicle data, and can be triggered to mark events by either emergency signals from the vehicle computer or by a special driver's recording button. Newer versions have GPS capabilities for noting vehicle position and for tracking.

Who monitors the footage?

Digital camera systems can be monitored either by in-house transit staff or by managed system providers, although for rural and smaller transit systems in-house monitoring may be more feasible in terms of cost. While in-house systems require initial installation fees and training on how to use the software and equipment, there are no monthly maintenance fees. Digital systems record events on Secure Digital (SD) Cards that can be changed out with fresh cards so events can be reviewed, or files can be downloaded directly from the camera onto portable laptops by fleet managers once buses return to the maintenance yard.

Camera systems are becoming more affordable

Although cameras are still rare in rural systems, Barkley said they are becoming more affordable.

"The good news is that live-feed cameras with exterior views that extend



The image on this monitor installed at an industry shows the quality of the picture generated by a digital camera.

30 feet, provide audio, and infrared vision can now be purchased for between \$300 and \$500," he said.

Pilot projects and realized benefits

With improved technology and better affordability, smaller transit systems that have never had cameras before are piloting them, while those that have had cameras are realizing the benefits and looking toward the future of camera technology. Sunflower Diversified Services of Great Bend, Kansas is experimenting with camera systems for the first time, as they try to determine what type of system is best for them. Valley Transit of Appleton, Wisconsin is a smaller urban system that has used two generations of camera systems and has seen significant results. The experiences of these two systems, shared below, provide good examples of cameras and bus transit safety.

Great Bend, Kansas. In November 2008, Sarah Krom and the managers of Sunflower Diversified Services General Public Transit in Great Bend experienced a nightmare incident:

a bad crash involving one of their vehicles, two different accounts of the crash, and no definitive record of what really happened. That sparked their interest in camera systems, and Sunflower is now piloting a two-way digital camera system with GPS to see if it is the best fit for them.

Krom said Sunflower is already learning interesting things with the cameras.

"The downside to cameras is they are time-intensive to review, and the digital card overwrites [itself], so we have to know what video to keep. But we think the installation and use of cameras is going to be validated. We've already seen video of driver inattentiveness and passengers who don't follow system policies. We think it will be good if we can use it to improve our performance," Krom said.

The camera-tests Krom and Sunflower Diversified Services are conducting may have a wider regional impact. Krom is chairperson for the Kansas Department of Transportation's Cooperative Transit District 14: the West Central Kansas Coordinated Transit District, Inc. She will report back to her CTD on Sunflower's camera-related results; results that other rural transit providers in central Kansas may find useful as they weigh their own camera needs.

Appleton, Wisconsin. Tom Luehring, operations supervisor for Valley Transit in Wisconsin, has witnessed the difference cameras have made in 18 years of use. Valley Transit, a small urban transit provider featured in the 2001 TCRP 66 Report, used to have live analog video cameras and 32 dummy units. Dummy units provided the safety benefits of video cameras without actually installing bulky and

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Sources

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expensive video recorders in every bus. Passengers and drivers could not tell the difference between a “live” camera and a dummy, and would theoretically improve behavior in the belief they were being taped.

Today, Valley Transit uses 4 digital interior cameras on each of their 16 fixed-route buses. The cameras capture interior views from the back, the front, the door, and out the windshield. Passengers see the cameras and know they are being recorded, leading to a reduction in the number of frivolous injury lawsuits.

“It also improves our customer service because the cameras have audio,” Luehring said. “We know when a passenger had a complaint, how the driver handled it, and we can bring it up if we need to.”

Cameras also help the agency with accident investigation, because “the cameras record vehicle speed, whether the emergency lights were activated, when brakes were applied, and the view out front,” Luehring said.

Video files are stored on 100 GB



Left and right side-mount exterior cameras give an upper hand on surrounding dangers.

hard drives (enough for 3 days’ worth of video), and Valley Transit manages the system in-house. Luehring and Valley Transit are already looking at purchasing rear and side-view exterior cameras and GPS for their next generation of cameras.

For more information on Cameras and Transit Safety, see the sources for this article listed on page 13. ●

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